

APPLICATION

FOR

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TITLE: A SCHEME FOR SPREAD SPECTRUM MULTIPLE  
ACCESS CODING

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A SCHEME FOR SPREAD SPECTRUM MULTIPLE ACCESS CODING

This application is a continuation of PCT/CN98/00151  
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Field of the Invention

5 The invention relates to a spread spectrum and digital  
multiple access wireless communications scheme, especially  
to a spread spectrum multiple access coding scheme applied  
in any digital communications system employing code  
division multiple access ("CDMA") and spread spectrum  
radio.

10 Background of the Invention

15 With the coming of the information society and the  
personal communications era, the demand on wireless  
communications technology is growing rapidly, but the  
frequency resources are very limited. A code division  
multiple access ("CDMA") technique is the only efficient  
way to resolve the contradiction between limited frequency  
resources and demand for high capacity. The capacity of  
traditional wireless multiple access techniques, e.g.,  
frequency division multiple access ("FDMA") and time  
20 division multiple access ("TDMA"), is fixed once designed,  
i.e., additional users can not be introduced beyond that  
capacity limit. But CDMA is different in that the capacity  
is only limited by the interference level and thus results

in the advantages of large capacity and soft capacity.  
That is, introducing an additional user is not precluded  
even though it may lead to reduced signal-to-noise ratio  
and quality of communications. So, unlike FDMA or TDMA, an  
5 insurmountable capacity limit does not exist.

As is noted above, the capacity of a CDMA system is  
interference-limited, thus, whether the interference level  
can be controlled or not determines the system's quality.  
Generally, the interference in the system consists of four  
10 parts: the first is local noise, which may be reduced by  
applying a low noise amplifier; the second is multiple  
access interference ("MAI"), which comes from the other  
users in the system; the third is inter-code or inter-  
symbol interference ("ISI"); and the fourth is neighboring  
15 cell or adjacent channel interference ("ACI"). By  
employing well-designed multiple access codes, MAI, ISI and  
ACI can be reduced or even eliminated.

In any CDMA system, each user has a specific spread  
spectrum multiple access code for identification.

20 Furthermore, to reduce the users' mutual interference, the  
spread spectrum multiple access codes must be orthogonal to  
each other. Indeed, orthogonality between any two users'  
signals is always required in any multiple access system.  
Given that the channel is an ideal linear time-invariant  
25 system, and accurate synchronization is realized in the  
system, then orthogonality between any two users' signals